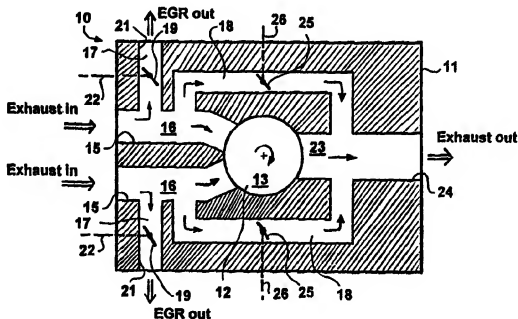




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(21) International Application Number: PCT/SE98/01200 (22) International Filing Date: 22 June 1998 (22.06.98) (30) Priority Data: 9702612-4 7 July 1997 (07.07.97) SE (71) Applicant (for all designated States except US): SCANIA CV AKTIEBOLAG (publ) [SE/SE]; S-151 87 Södertälje (SE). (72) Inventor; and (75) Inventor/Applicant (for US only): MÅRDBERG, Jörgen [SE/SE]; Förmansvägen 20, 4 tr, S-151 47 Södertälje (SE). (74) Agent: WALDEBÄCK, Hans; Scania CV AB, Patents, S-151 87 Södertälje (SE).		(81) Designated States: BR, DE, JP, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published With international search report.

(54) Title: A TURBOCHARGER AND A METHOD OF INSTALLATION OF TURBOCHARGER



(57) Abstract

A turbocharger (10) for an internal combustion engine and which has a housing (11) with a turbine (13) housed in a chamber (12) in the housing, and driven by exhaust gases from the engine, the turbocharger having integrally therein at least one of a wastegate (25) and EGR valve (19).

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A turbocharger and a method of installation of turbochargerField

5 This invention relates to turbochargers of the type used in cooperation with internal combustion engines, mainly compression ignition engines. In particular the invention relates to a turbocharger housing according to the preamble of claim 1 and a turbocharger according to the preamble of claim 6. The invention also relates to a method of installation of a turbocharger on an internal combustion engine according to the preamble of claim 10.

10

Background

A turbocharger has a compressor located in the air intake system of an internal combustion engine in order to increase the amount of air and thereby also the fuel delivered to a combustion chamber to increase power output from an engine. The compressor is driven by a turbine located in the exhaust gas outlet and connected to the compressor by a shaft.

This has two advantages: 1) the engine is more efficient because it utilises energy recovered from the exhaust gas flow and 2) a smaller engine can be made to produce a given power output.

The power available to drive the compressor is a nonlinear function of engine speed so that there is little boost at low speeds whereas at high speeds the boost is at a maximum. Most turbochargers are connected to a wastegate which enables exhaust gases to bypass the turbine, and which makes it possible to regulate the manifold pressure. The wastegate is typically controlled by a diaphragm that senses boost pressure.

In order to meet environmental considerations in relation to exhaust gases produced in the combustion chamber, turbochargers may also be included in an exhaust gas recycling (EGR) system where a percentage of the exhaust gases are recirculated through the combustion chambers. This is typically achieved by returning an amount of the exhaust gas to the inlet manifold.

30

Typically the engine exhaust manifold is made with connections to the turbocharger, EGR, and wastegate, and the turbocharger is made with corresponding connections. The EGR valve, and wastegate are bulky and all the associated connections are susceptible to leaking.

5

Statements of Invention

An object with the present invention is provide turbo charged engines with EGR valves and/or wastegate valves that neither requires a lot of space, nor is suseptible to leaks.

10 Accordingly there is provided a turbocharger housing for an internal combustion engine with the features that are mentioned in the characterising part of claim 1.

By providing the turbocharger housing with at least one chamber and/or passageway for housing at least one of a wastegate and EGR valve the above mentioned objects will be
15 accomplished. Preferably, the housing has a respective chamber and/or passageway for at least one wastegate, preferably two, and at least one EGR valve, preferably two EGR valves.

The two wastegate passageways may be connected to the turbine chamber exhaust gas outlet downstream of the wastegate location to form a single exhaust gas outlet port for exhaust
20 gases exiting the housing.

The housing may further include a pair of exhaust gas inlet ports for the turbine chamber and each inlet port opens into a respective passageway for an EGR valve and a wastegate.

25 Also according to the invention there is provided a turbocharger for an internal combustion engine and which has a turbine driven by exhaust gases from the engine and includes integrally within the turbocharger at least one of a wastegate and EGR valve.

Yet a further aspect of the invention provides a method of installation on an internal
30 combustion engine of a turbocharger, wastegate, and/or EGR valve, according to the method mentioned in the characterising part of claim 10

Although a turbocharger housing according to the invention is more complicated than a conventional turbocharger housing, since the whole is supplied as a single unit it is easier to assemble to a vehicle during manufacture of the vehicle, and can be replaced during maintenance as a single unit. The invention will be described by way of example and with
5 reference to the accompanying drawing.

Description of Drawings

Fig. 1 is a schematic drawing of a turbine housing of a turbocharger. It will be appreciated
10 that the housing can be shaped as is desired to accommodate the turbocharger on a particular engine.

Description of Invention

- 15 With reference to the accompanying schematic drawing Fig. 1, a turbocharger 10 has a housing 11 of a suitable material such as a shaped and machined metal, typically steel or iron. The housing 11 includes a turbine chamber 12 housing a turbine 13 which is mounted on a shaft (not shown) connected to a compressor, as is well known for turbochargers.
- 20 The turbocharger in use is connected to a pair of exhaust manifolds as might be used in a direct injection diesel engine arranged in a V configuration. Alternatively the pair of exhaust manifolds might be connected to two different sets of cylinders as might be used in an engine with the cylinders arranged in line.
- 25 The housing 11 has a respective exhaust inlet port 15 for each engine exhaust manifold. In this case there are two inlet ports 15 each for connection to one of the two exhaust manifolds. Each inlet port opens into a respective passageway 16 connected to the turbine chamber 12.
- 30 Each passageway 16 also connects to two further passageways 17 and 18. Each passageway 17 houses an EGR control valve 19 which may be located in the passageway 17, or in a chamber (not shown) formed in the passageway 17. The two passageways 17 have outlet

ports 21 that connect to the engine exhaust gas recycling system. The EGR valves are connected to control lines 22 in the conventional manner.

The passageways 18 both bypass the turbine chamber 12 and combine with the exhaust gas outlet 23 from the turbine chamber 12 so that the passageways 18 and outlet 13 merge into a single exhaust gas outlet port 24. The outlet port 24 is connectable with the vehicle exhaust system. A wastegate 25 is located in each passageway 18, or a chamber formed therein (not shown) and is controlled by control line 26, either electronically or mechanically by a diaphragm as is well known.

10

The provision of two EGR valves 19 and two wastegates 25 reduces the possibility of an imbalance in pressures between the two exhaust manifolds that otherwise could occur, and will result in balanced pressures to the turbine chamber.

Claims

1. A turbocharger housing for an internal combustion engine and which includes a turbine chamber (12) , **characterised** by the housing (11) having at least one chamber
5 and/or passageway (17,18) for housing at least one of a wastegate (25) and EGR valve (19).
2. A housing as claimed in Claim 1, **characterised** in that the housing (11) has a respective chamber and/or passageway (17, 18) for at least one wastegate (25) and at least one EGR valve (19).
- 10 3. A housing as claimed in Claim 2, **characterised** in that the housing (11) has respective chambers and/or passageways (17,18) for at least two wastegates (25) and two EGR valves (19).
- 15 4. A housing as claimed in Claim 3, **characterised** in that the two wastegate passageways (18) are connected to a turbine chamber (12) exhaust gas outlet (23) downstream of the wastegate (25) location to form a single exhaust gas outlet port (24) for exhaust gases exiting the housing (11).
- 20 5. A housing as claimed in Claim 3 or Claim 4. **characterised** in that there is further provided a pair of exhaust gas inlet ports (15) for the turbine chamber (12) and each inlet port opens (15) into a respective passageways (17,18) for an EGR valve (19) and a wastegate (25).
- 25 6. A turbocharger for an internal combustion engine **characterised** by a housing (11) as claimed in any one of Claims 1 to 5.
7. A turbocharger as claimed in Claim 6 **characterised** by integrally within the turbocharger is arranged at least one of a wastegate (25) and EGR valve (19).

8. A turbocharger as claimed in Claim 7 **characterised** by two wastegates (25) housed in respective passageways (18) in the turbocharger, and which combine with the exhaust gas outlet (23) from the turbine chamber (12) immediately upstream of an exhaust gas outlet port (24) from the turbocharger.

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9. A turbocharger as claimed in Claim 7 or Claim 8 **characterised** by the turbocharger including two EGR valves (19) each housed in a respective passageway (17) connected to a respective exhaust gas inlet passageway (16) to the turbine.

10 10. A method of installation on an internal combustion engine of a turbocharger , wastegate, and/or EGR valve, **characterised** in that the turbocharger, EGR valve (19) and/or wastegate (25) are all housed in a single unit with only a single outlet (24) connection to the vehicle exhaust system and a respective inlet (15) connection for each exhaust manifold.

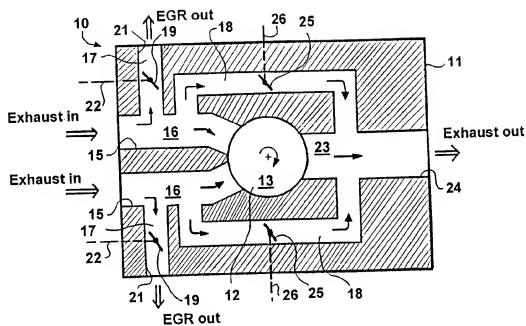


Fig 1

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 98/01200

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: F02B 37/02, F02B 47/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: F02B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	FR 2322264 A1 (BBC SOCIETE ANONYME BROWN, BOVERI & CIE), 25 March 1977 (25.03.77) --	1-10
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INTERNATIONAL SEARCH REPORT
Information on patent family members

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